



***Federal Railroad Administration  
Office of Railroad Safety  
Accident and Analysis Branch***

***Accident Investigation Report  
HQ-2018-1249***

***Amtrak (ATK)  
Crozet, VA  
January 31, 2018***

***Note that 49 U.S.C. §20903 provides that no part of an accident or incident report, including this one, made by the Secretary of Transportation/Federal Railroad Administration under 49 U.S.C. §20902 may be used in a civil action for damages resulting from a matter mentioned in the report.***

**SYNOPSIS**

On January 31, 2018, at approximately 11:16 a.m., EST, a westbound National Passenger Railroad Corporation (Amtrak) passenger train traveling on single main track in TCS territory collided with a garbage truck at a public highway grade crossing. The accident occurred near Crozet, Virginia, at milepost (MP) 195.85, on the Buckingham Branch Railroad's North Mountain Subdivision at the Lanetown Road highway-rail grade crossing. The impact ejected one of the three occupants in the cab of the truck. This occupant was fatally injured while the driver and another occupant were critically injured. The garbage truck was destroyed by the impact. The U.S.DOT National Highway-Rail Crossing Inventory number is 224704E. The railroad crossing was equipped with warning lights, gates and a bell. There were four reported injuries to the train crew and four reported injuries to passengers. The lead locomotive derailed on its front truck (first two axles) and received damage to the cab. The estimated damage to the locomotive is \$40,491.48. The estimated damages to the track and signal structures is \$244,000.

Weather conditions at time of impact were clear and 33F. Winds were from the southwest at approximately 2.9 to 4.9 mph with 0 accumulated precipitation reported.

FRA determined the probable cause of the accident was cause code M308 – Highway user deliberately disregarded crossing warning devices.

Additionally, a possible contributing factor of cause code M301 – Highway user impairment because of drug or alcohol usage (as determined by local authorities, e.g., Police) was identified.

**TRAIN SUMMARY**

|  |                            |  |
|--|----------------------------|--|
| 1. Name of Railroad Operating Train #1<br>Amtrak (National Railroad Passenger Corporation) | 1a. Alphabetic Code<br>ATK | 1b. Railroad Accident/Incident No.<br>151771 |
|--|----------------------------|--|

**GENERAL INFORMATION**

|   |   |  |
|---|---|--|
| 1. Name of Railroad or Other Entity Responsible for Track Maintenance<br>Buckingham Branch Railroad Company | 1a. Alphabetic Code<br>BB                                     | 1b. Railroad Accident/Incident No.<br>2018T101         |
| 2. U.S. DOT Grade Crossing Identification Number<br>224704E   | 3. Date of Accident/Incident<br>1/31/2018                     | 4. Time of Accident/Incident<br>11:16 AM               |
| 5. Type of Accident/Incident<br>RR Grade Crossing   |   |  |
| 6. Cars Carrying HAZMAT 0   | 7. HAZMAT Cars Damaged/Derailed 0                             | 8. Cars Releasing HAZMAT 0                             |
|   | 9. People Evacuated 0   | 10. Subdivision<br>North Mountain Subdivision          |
| 11. Nearest City/Town<br>Crozet   | 12. Milepost (to nearest tenth)<br>195.85                     | 13. State Abbr.<br>VA                                  |
|   |   | 14. County<br>ALBEMARLE                                |
| 15. Temperature (F)<br>33 °F  | 16. Visibility<br>Day   | 17. Weather<br>Clear                                   |
|   |   | 18. Type of Track<br>Main                              |
| 19. Track Name/Number<br>single main  | 20. FRA Track Class<br>Freight Trains-40, Passenger Trains-60 | 21. Annual Track Density (gross tons in millions)<br>1 |
|   |   | 22. Time Table Direction<br>West                       |
| 23. PTC Preventable<br>No   |   |  |

**OPERATING TRAIN #1**

|   |             |                        |   |                                |   |   |                                  |  |            |                                    |            |     |
|---|-------------|------------------------|---|--------------------------------|---|---|----------------------------------|--|------------|------------------------------------|------------|-----|
| 1. Type of Equipment Consist:<br>Passenger Train-Pulling  |             |                        |   |                                | 2. Was Equipment Attended?<br>Yes   |   | 3. Train Number/Symbol<br>P92331 |  |            |                                    |            |     |
| 4. Speed (recorded speed, if available)<br>R - Recorded 61.0 MPH<br>E - Estimated   |             | Code<br>R              | 5. Trailing Tons (gross excluding power units)      |                                | 6a. Remotely Controlled Locomotive?<br>0 = Not a remotely controlled operation<br>1 = Remote control portable transmitter<br>2 = Remote control tower operation<br>3 = Remote control portable transmitter - more than one remote control transmitter |   |                                  |  |            | Code<br>0                          |            |     |
| 6. Type of Territory<br>Signalization:<br><u>Signaled</u><br>Method of Operation/Authority for Movement:<br><u>Signal Indication</u><br>Supplemental/Adjunct Codes:<br><u>Q</u> |             |                        |   |                                |   |   |                                  |  |            |                                    |            |     |
| 7. Principal Car/Unit   |             | a. Initial and Number  |   | b. Position in Train           |   | c. Loaded (yes/no)                                    |                                  | 8. If railroad employee(s) tested for drug/alcohol use, enter the number that were positive in the appropriate box |            | Alcohol                            | Drugs      |     |
| (1) First Involved<br><i>(derailed, struck, etc.)</i>   |             | AMT 145                |   | 1                              |   | no  |                                  |  |            | 0                                  | 0          |     |
| (2) Causing <i>(if mechanical, cause reported)</i>  |             |                        |   |                                |   | no  |                                  | 9. Was this consist transporting passengers?   |            |                                    | Yes        |     |
| 10. Locomotive Units (Exclude EMU, DMU, and Cab Car Locomotives.)   | a. Head End | Mid Train              |   | Rear End                       |   | 11. Cars (Include EMU, DMU, and Cab Car Locomotives.) | Loaded                           |  | Empty      |                                    | e. Caboose |     |
|   |             | b. Manual              | c. Remote   | d. Manual                      | e. Remote   |   | a. Freight                       | b. Pass.   | c. Freight | d. Pass.                           |            |     |
| (1) Total in Train  | 1           | 0                      | 0   | 0                              | 1   | (1) Total in Equipment Consist                        | 0                                | 10   | 0          | 0                                  | 0          |     |
| (2) Total Derailed  | 1           | 0                      | 0   | 0                              | 0   | (2) Total Derailed                                    | 0                                | 0  | 0          | 0                                  | 0          |     |
| 12. Equipment Damage This Consist<br>40491  |             |                        | 13. Track, Signal, Way & Structure Damage<br>244000 |                                |   |   |                                  |  |            |                                    |            |     |
| 14. Primary Cause Code<br>M308 - Highway user deliberately disregarded crossing warning devices   |             |                        |   |                                |   |   |                                  |  |            |                                    |            |     |
| 15. Contributing Cause Code<br>M301 - Highway user impairment because of drug or alcohol usage (as determined by local authorities, e.g., police)                               |             |                        |   |                                |   |   |                                  |  |            |                                    |            |     |
| Number of Crew Members  |             |                        |   |                                |   | Length of Time on Duty                                |                                  |  |            |                                    |            |     |
| 16. Engineers/Operators   |             | 17. Firemen            |   | 18. Conductors                 |   | 19. Brakemen  |                                  | 20. Engineer/Operator  |            | 21. Conductor                      |            |     |
| 1   |             | 0                      |   | 1                              |   | 2   |                                  | Hrs: 1 Mins: 16  |            | Hrs: 1 Mins: 16                    |            |     |
| Casualties to:  |             | 22. Railroad Employees |   | 23. Train Passengers           |   | 24. Others  |                                  | 25. EOT Device?  |            | 26. Was EOT Device Properly Armed? |            |     |
| Fatal   |             | 0                      |   | 0                              |   | 1   |                                  | N/A  |            | N/A                                |            |     |
| Nonfatal  |             | 4                      |   | 4                              |   | 2   |                                  | 27. Caboose Occupied by Crew?  |            |                                    |            | N/A |
| 28. Latitude<br>38.077340000  |             |                        |   | 29. Longitude<br>-78.716741000 |   |   |                                  |  |            |                                    |            |     |

**CROSSING INFORMATION**

| Highway User Involved  |   | Rail Equipment Involved  |   |
|--|---|--|---|
| 1. Type<br>Other (Spec. In Narrative)  |   | 5. Equipment<br>Train (Units Pulling)  |   |
| 2. Vehicle Speed ( <i>est. mph at impact</i> )<br>0  | 3. Direction ( <i>geographical</i> )<br>South       | 6. Position of Car Unit in Train<br>1  |   |
| 4. Position of Involved Highway User<br>Stopped on Crossing  |   | 7. Circumstance<br>Rail Equipment Struck Highway User  |   |
| 8a. Was the highway user and/or rail equipment involved in the impact transporting hazardous materials?<br>Neither   |   | 8b. Was there a hazardous materials release by<br>Neither  |   |
| 8c. State here the name and quantity of the hazardous material released, if any.<br>N/A  |   |  |   |
| 9. Type of Crossing<br>1. Gates      4. Wig wags      7. Crossbucks      10. Flagged by crew<br>2. Cantilever FLS      5. Hwy. traffic signals      8. Stop signs      11. Other ( <i>spec. in narr.</i> )<br>3. Standard FLS      6. Audible      9. Watchman      12. None<br><br>1, 3, 6, 7, 11 |   | 10. Signaled Crossing Warning<br>1, 1, 1   | 11. Roadway Conditions<br>Dry   |
| 12. Location of Warning<br>Both Sides  |   | 13. Crossing Warning Interconnected with Highway Signals<br>No                                   | 14. Crossing Illuminated by Street Lights or Special Lights<br>No       |
| 15. Highway User's Age<br>30   | 16. Highway User's Gender<br>Male                   | 17. Highway User Went Behind or in Front of Train and Struck or was Struck by Second Train<br>No | 18. Highway User<br>Went around the gate                                |
| 19. Driver Passed Standing Highway Vehicle<br>No   |   | 20. View of Track Obscured by ( <i>primary obstruction</i> )<br>Not Obstructed                   |   |
| Casualties to:   | Killed  | Injured  | 21. Driver was Injured  |
| 23. Highway-Rail Crossing Users  | 1   | 2  | 24. Highway Vehicle Property Damage ( <i>est. dollar damage</i> ) 58950 |
| 26. Locomotive Auxiliary Lights?<br>Yes  | 27. Locomotive Auxiliary Lights Operational?<br>Yes | 22. Was Driver in the Vehicle?<br>Yes  | 25. Total Number of Vehicle Occupants ( <i>including driver</i> ) 3     |
| 28. Locomotive Headlight Illuminated?<br>Yes   |   | 29. Locomotive Audible Warning Sounded?<br>Yes   |   |

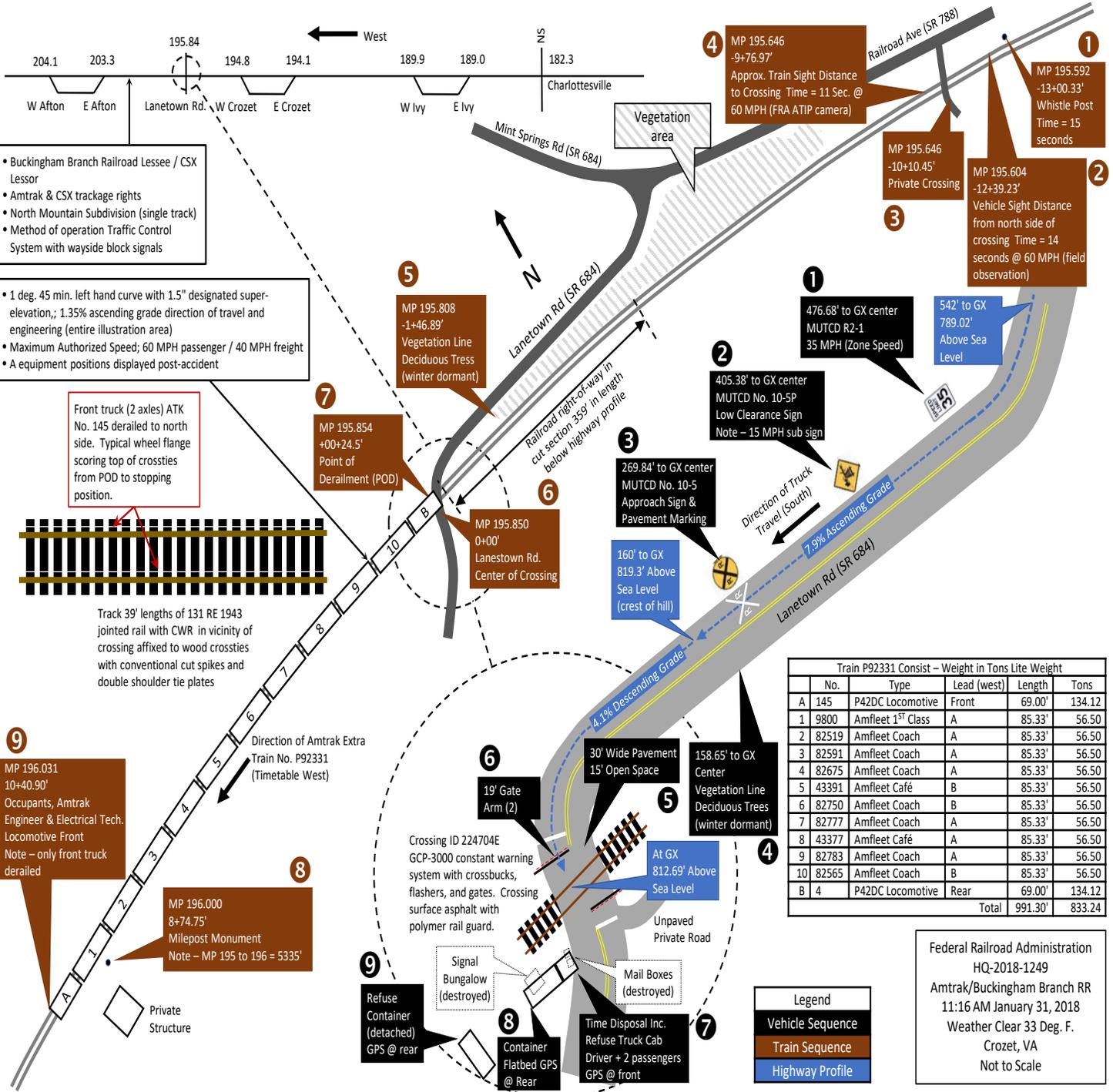
**10. Signaled Crossing Warning**

**Explanation Code**

- |  |  |
|--|--|
| 1 - Provided minimum 20-second warning             | A - Insulated rail vehicle   |
| 2 - Alleged warning time greater than 60 seconds   | B - Storm/lightning damage   |
| 3 - Alleged warning time less than 20 seconds      | C - Vandalism  |
| 4 - Alleged no warning                             | D - No power/batteries dead  |
| 5 - Confirmed warning time greater than 60 seconds | E - Devices down for repair  |
| 6 - Confirmed warning time less than 20 seconds    | F - Devices out of service   |
| 7 - Confirmed no warning                           | G - Warning time greater than 60 seconds attributed to accident-involved train stopping short of the crossing, but within track circuit limits, while warning devices remain continuously active with no other in-motion train present |
| N/A - N/A  | H - Warning time greater than 60 seconds attributed to track circuit failure (e.g., insulated rail joint or rail bonding failure, track or ballast fouled)   |
|  | J - Warning time greater than 60 seconds attributed to other train/equipment within track circuit limits   |
|  | K - Warning time less than 20 seconds attributed to signals timing out before train's arrival at the crossing/island circuit   |
|  | L - Warning time less than 20 seconds attributed to train operating counter to track circuit design direction  |
|  | M - Warning time less than 20 seconds attributed to train speed in excess of track circuit's design speed  |
|  | N - Warning time less than 20 seconds attributed to signal system's failure to detect train approach   |
|  | O - Warning time less than 20 seconds attributed to violation of special train operating instructions  |
|  | P - No warning attributed to signal systems failure to detect the train  |
|  | R - Other cause(s). Explain in Narrative Description   |

SKETCHES

Sketch - Accident Sketch



- Buckingham Branch Railroad Lessee / CSX Lessor
- Amtrak & CSX trackage rights
- North Mountain Subdivision (single track)
- Method of operation Traffic Control System with wayside block signals

- 1 deg. 45 min. left hand curve with 1.5" designated super-elevation; 1.35% ascending grade direction of travel and engineering (entire illustration area)
- Maximum Authorized Speed; 60 MPH passenger / 40 MPH freight
- A equipment positions displayed post-accident

Front truck (2 axes) ATK No. 145 derailed to north side. Typical wheel flange scoring top of crossties from POD to stopping position.



Track 39' lengths of 131 RE 1943 jointed rail with CWR in vicinity of crossing affixed to wood crossties with conventional cut spikes and double shoulder tie plates

MP 196.031  
10+40.90'  
Occupants, Amtrak Engineer & Electrical Tech. Locomotive Front  
Note - only front truck derailed

MP 196.000  
8+74.75'  
Milepost Monument  
Note - MP 195 to 196 = 5335'

| Train P92331 Consist - Weight in Tons Lite Weight |                                    |             |        |         |        |
|---|------------------------------------|-------------|--------|---------|--------|
| No.   | Type                               | Lead (west) | Length | Tons    |        |
| A 145   | P42DC Locomotive                   | Front       | 69.00' | 134.12  |        |
| 1   | 9800 Amfleet 1 <sup>st</sup> Class | A           | 85.33' | 56.50   |        |
| 2   | 82519 Amfleet Coach                | A           | 85.33' | 56.50   |        |
| 3   | 82591 Amfleet Coach                | A           | 85.33' | 56.50   |        |
| 4   | 82675 Amfleet Coach                | A           | 85.33' | 56.50   |        |
| 5   | 43391 Amfleet Café                 | B           | 85.33' | 56.50   |        |
| 6   | 82750 Amfleet Coach                | B           | 85.33' | 56.50   |        |
| 7   | 82777 Amfleet Coach                | A           | 85.33' | 56.50   |        |
| 8   | 43377 Amfleet Café                 | A           | 85.33' | 56.50   |        |
| 9   | 82783 Amfleet Coach                | A           | 85.33' | 56.50   |        |
| 10  | 82565 Amfleet Coach                | B           | 85.33' | 56.50   |        |
| B 4   | P42DC Locomotive                   | Rear        | 69.00' | 134.12  |        |
| Total   |                                    |             |        | 991.30' | 833.24 |

Federal Railroad Administration  
HQ-2018-1249  
Amtrak/Buckingham Branch RR  
11:16 AM January 31, 2018  
Weather Clear 33 Deg. F.  
Crozet, VA  
Not to Scale

## NARRATIVE

**Circumstances Prior to the Accident**

The crew of National Passenger Railroad Corporation (Amtrak) westbound train P92331 (the train) included a locomotive engineer, a conductor and two assistant conductors. The Engineer and Conductor went on duty on January 31, 2018, at 10 a.m., EST, at the Amtrak Station in Charlottesville, Virginia.

This was the designated crew change site for the special Congressional train chartered to transport members of Congress to The Greenbrier Resort in White Sulphur Springs, West Virginia. The train left Washington, D.C., at 8:29 a.m., EST, en route to White Sulphur Springs, with approximately 416 passengers on board. All crew members received more than the statutory off-duty period prior to reporting for duty. Also on the train was a road foreman, two mechanical technicians, a superintendent, an assistant superintendent, and lead service attendants.

Their assigned train consisted of two locomotives, one business car, seven coach cars and two café cars. The train was approximately 991 feet long, and weighed about 833 tons. The train was scheduled to transport members of Congress, Congressional aides and their family members. The scheduled recrew performed a running brake test, and departed Charlottesville Station at approximately 10:57 a.m.

Near Lanetown Road, a garbage truck driver and two workers were approaching the Lanetown Road crossing at grade from the north side, headed in a southbound direction. The truck crossed the center line into the left lane, which provided a space between the gates large enough for the truck to pass without stopping. Once the driver had committed to driving around the gates, he found a row of mailboxes in his direct lane of travel. He abruptly stopped once he realized that he was pinned between the gate and the mailboxes.

As the westbound train approached the accident area, the Engineer was seated at the controls on the right side of the leading locomotive. The Conductor was seated in a coach car along with the two Assistant Conductors; the Mechanical Technician was seated in the middle seat of the lead locomotive; the Road Foreman was seated in the fireman's seat on the left side of the locomotive cab; and a Congressional security officer was standing behind the engineer. There was a total of four people in the lead locomotive at the time of impact.

This segment of railroad track consists of an eight-tenths mile long, 1.45-degree, left-hand curve. The curve was designed and engineered with, and has an average of, 1.5 inches of super elevation. The grade in the curve is ascending at 1.35-degrees throughout the entire length of the curve in the direction of travel. Lanetown Road is situated at about the midpoint of this left-hand curve with geometry consistent with the design and measurements taken in the field. This is single main track with a Traffic Control System (TCS) in service as indicated by railroad timetable. The railroad timetable direction of the train was west. The geographic direction was west. Timetable directions are used throughout this report.

Weather conditions at time of impact were clear and 33F. Winds were from the southwest at

approximately 2.9 to 4.9 mph with 0 accumulated precipitation reported.

## **The Accident**

The train, traveling westbound on the Buckingham Branch Railroad in Crozet, Virginia, struck the truck traveling south at Lanetown Road (Crossing Number: DOT# 224704E – mile post (MP) 195.85) at 11:16 a.m., EST, on January 31, 2018. Albemarle County Police and Crozet Fire and Rescue were the first responders on the scene.

The grade crossing was protected by flashing lights, gates, and a bell. Additionally, an advanced warning sign for low ground clearance, and a cross buck sign are present. The crossing's activation warning system was grade crossing predictor technology. The train struck the garbage truck broadside toward the rear of the compactor, causing the truck to spin counter-clockwise. The impact broke the truck into several large pieces. The impact also ejected one of the three occupants in the cab of the truck. This occupant was fatally injured while the driver and another occupant were critically injured and transferred to UVA Medical Center in Charlottesville.

There were injuries reported to four Amtrak crew members (the Engineer, Road Foreman, Mechanical Worker, and an Attendant), and four passengers. Two Amtrak crew members were treated at UVA Medical Center and subsequently released. The third crew member was treated at MedStar Washington Hospital Center and subsequently released. The fourth crew member was treated at the scene.

After impact, the truck struck the grade crossing bungalow destroying the contents. The lead truck (first two axles) of the lead Amtrak locomotive (ATK 145) derailed due to the impact. The maximum train speed at the crossing is 60 miles per hour (mph) for passenger trains and 40 mph for freight. The highway speed limit is 35 mph. The recorded speed for the train was 61 mph approaching Lanetown Road and the garbage truck was stopped on the tracks at the time of impact.

The Buckingham Branch Railroad has an exemption from Positive Train Control (PTC) based on limited freight and passenger service. PTC, however, does not prevent highway-railroad grade crossing accidents. This accident was not PTC preventable.

The accident history for the highway-railroad grade crossing at Lanetown Road shows one previous incident on February 5, 1999. There are no previous records of injuries or fatalities reported. The signal bungalow was destroyed in the accident making it impossible to conduct FRA-mandated inspections and obtain downloads of the crossing's warning history.

The locomotive (ATK 145) was re-railed by Cranemasters at approximately 10:43 p.m., EST. Minor track work was performed and service was resumed at 12:35 a.m., EST, with a 10mph speed restriction at the accident site. The rest of the train was isolated for inspection at Ivy City Yard in Washington, D.C. The line remained in service with a stop and flag order in place. Buckingham Branch Railroad contracted R.J. Croman Signaling to replace the crossing's instrument bungalow along with burying new underground

cable. The crossing was returned to normal service on February 9, 2018.

## **Analysis and Conclusions**

**Analysis – Post-Accident Interviews:** Formal interviews conducted by the National Transportation Safety Board (NTSB) and FRA revealed the Engineer, the Road Foreman, and the Mechanical Technician all witnessed the gates in the down position, and the garbage truck driving around the gates before stopping while the rear of the truck was fouling the crossing at Lanetown Road. There were no conflicting statements given by any person interviewed.

**Conclusion:** Post accident interviews of the crew on the lead locomotive indicate the truck deliberately drove around the functioning warning devices (lowered gates, activated lights, and bells). FRA determined the actions of the truck to be the probable cause of this accident.

**Analysis – Outward-Facing Camera:** The lead locomotive was equipped with an outward-facing camera. FRA investigators viewed the recorded images at NTSB Headquarters in Washington, D.C. The video shows the truck traveling southbound on Lanetown Road and, without stopping, crossing into the left lane of travel to drive around the activated warning devices. With the rear of the truck still fouling the tracks, the truck then stopped behind some mailboxes, located just off the road on the west side, immediately before impact.

**Conclusion:** The lead locomotive's outward-facing camera confirmed that the driver deliberately drove around the functioning warning device (lowered gates, activated lights, and bells). FRA determined the actions of the truck to be the probable cause of this accident.

**Analysis – Toxicological:** FRA does not require drug and alcohol testing for the train crew due to the type of accident. However, law enforcement officers asked the Engineer, Road Foreman, and Truck Driver if they would submit to a voluntarily blood test, and all complied with the request. FRA received confirmation from the NTSB that the tests for the Engineer and Road Foreman were negative.

The garbage truck driver tested positive for three drugs in his blood (marijuana, gabapentin (Neurontin, others), and midazolam (Versed, others). Marijuana was confirmed positive at a concentration of 6.6 ng/mL of parent THC and 59 ng/mL of the carboxy metabolite (THCA). Gabapentin (primarily prescribed for the treatment of seizures and neuropathic pain) was reported at a concentration of 2200 ng/mL and midazolam (a benzodiazepine) was positive at 10 ng/mL. No urine samples from the driver were apparently tested.

Gabapentin and midazolam would normally be prescribed together for the treatment of seizures from a medical condition such as epilepsy, although other reasons for the combination could be possible. Both the concentrations of gabapentin and midazolam in the driver's blood appeared to be within the expected clinical range (see Winek et al, 2001; Schulz and Schmoldt, 2003; and TIAFT, 2004). The drug concentrations considered independently gave no per se evidence of overuse or misuse. The driver

would not speak with investigators regarding any prescriptions or medical conditions.

Gabapentin is not a Federally managed drug under the Federal Controlled Substances Act (CSA). However, it can have a marked sedative effect and side effects often include drowsiness and dizziness. It is prescribed for the treatment of epileptic seizures and other seizure disorders, for the treatment of neuropathic pain (such as shingles), and for the treatment of restless leg syndrome. It has a number of other acceptable medical “off-label” uses. It has also more recently become a drug of abuse because of its euphoric effect.

Midazolam is commonly used to induce sleepiness and sedation for surgery, for decreasing anxiety and agitation, and for the management of certain types of seizures. It is a Schedule IV drug under the CSA. It can also provide a euphoric effect.

**Conclusion:** No drug or alcohol use was found by the Engineer and Road Foreman.

Based upon the analysis of the test results, it was likely that the garbage truck driver had last used marijuana within a few hours of the accident, whether he was an occasional or chronic user of the drug. At least some impairment of driving-related tasks was possible and perhaps likely. Marijuana can significantly impair judgment, motor coordination, and reaction time, and several recent studies have found a direct relationship between blood THC concentration and impaired driving ability (Lenne et al, 2010; Hartman et al, 2013; Hartman et al, 2015).

In addition, marijuana, gabapentin, and midazolam each can have Central Nervous System (CNS) depressant effects, which might affect the ability to perform skilled tasks especially when used in combination. Given the concentrations found for each of the three drugs, it would be expected that the combination of sedating capability of each of the drugs, the potential for impaired judgement and driving skills from the recent use of marijuana, and a potentially severe underlying medical condition (such as a seizure disorder like epilepsy), the driver should not have been on the road at the time of the accident. It is also possible that if his driving position required a Commercial Driver’s License (CDL), he could have been medically disqualified from holding a CDL in addition to having used a prohibited substance. FRA determined that impairment of the garbage truck driver was likely a contributing factor in the accident.

**Analysis – Locomotive Engineer Operating Performance:** The locomotive was also equipped with a speed indicator and an event recorder, as required. The relevant event recorder data was downloaded by the NTSB and the information was provided to FRA for review. The posted speed was 60 mph and the recorded speed was 61 mph. This speed differential is within the tolerance requirements for event recorders in 49 CFR § 229.135(b) and speed indicators in 49 CFR § 229.117(a)(1).

**Conclusion:** The Locomotive Engineer followed all applicable railroad operating and train handling requirements and was not a contributing cause of the accident.

**Analysis – Fatigue:** FRA uses an overall effectiveness rate of 77.5 percent as the baseline for fatigue

analysis. At or above this baseline, FRA does not consider fatigue as probable for any employee. FRA obtained a 10-day work history for the crew involved in this accident. Default software sleep settings and information from the fatigue-related questionnaires was used for each employee. Upon analysis of that information, FRA concluded fatigue was not probable for the crew of the train.

**Conclusion:** FRA determined fatigue did not contribute to the cause or severity of this accident.

**Analysis – Track Conditions:** An FRA Region 2 Track Inspector responded to the accident as part of the investigation. This track is leased and maintained by the Buckingham Branch Railroad. The FRA Track Inspector performed a walking inspection of the Buckingham Branch single main track from MP 195.7 to MP 196.1 along with a Virginia State Corporation Commission Inspector. The team inspected the track's gage, alignment, and degree of curvature. The section of track they inspected was a 1-degree, 45-minute, left-hand curve. No exceptions were taken in the track measurements for the posted Class 3 track.

**Conclusion:** FRA determined track conditions did not contribute to the cause or severity of this accident.

**Analysis - Mechanical:** FRA conducted a comprehensive review of all regulatory required testing and inspections of the locomotives and cars of the train that were performed prior to departure from Washington, D.C. No exceptions were noted.

FRA also conducted post-accident mechanical reviews both at the accident site and later at the Amtrak Ivy City Maintenance Facility in Washington, D.C. As part of the mechanical review, ATK 145's (leading locomotive) horn, bell, headlight and auxiliary (ditch) lights were found to be functioning as intended. No exceptions were noted as part of the post-accident mechanical reviews.

**Conclusion:** FRA determined there were no mechanical conditions that contributed to the cause or severity of this accident.

**Analysis – Highway-Rail Grade Crossing (Active Warning Devices):** On January 31, 2018, Region 2's Crossing and Trespassing Manager conducted an inspection of the Lanetown highway-railroad grade crossing. The highway-railroad crossing at grade is equipped with warning lights, gates, and a bell. The system that controls the crossing was a Safetran Grade Crossing Predictor (GCP 3000) with relay control. There are advanced warning signs, including a low clearance sign and a cross buck sign, posted about 450 feet from the crossing. There are also pavement markings within 300 feet of the crossing. The pavement markings are clearly distinguishable.

The railroad has a whistle post in place around 1,300 feet east of the crossing. All three train crewmembers stated the locomotive engineer began sounding the whistle when the train neared this post. This was validated by analysis of the event recorder data.

The train approach has an approximate sight distance of 14 seconds entering the crossing from the east.

The engineering prints for the crossing indicate the grade crossing predictor unit was set up for 30 seconds warning time.

The active warning devices were unable to be tested by Buckingham Branch Signal Management and FRA on the day of the accident due to the crossing instrument bungalow's destruction by debris from the garbage truck. Visual inspections found minor defects with components of the crossing that were not destroyed. The defects recorded were: (1) a cross buck sign not in good condition; (2) a quarterly inspection report not signed by the inspector; (3) a gate arm measured at 40 inches high which is not maintained within a 42 to 54-inch height standard; and (4) two non-insulated rail joints were missing bonds. None of these defects were found to have contributed to the accident.

**Conclusion:** FRA concluded that the crossing's active warning devices were operating as intended and were not a contributing cause in the accident.

### **Overall Conclusions**

Amtrak and Buckingham Branch Railroad followed their own operating rules and all Federal regulations. The investigation found that the highway-railroad grade crossing warning system and all locomotive safety devices functioned as intended. There were no exceptions taken to the train's operation. Based on post-accident interviews with the crew, and supporting video evidence from the locomotive's outward-facing camera, the driver of the truck crossed into the left lane to drive around the crossing gates without stopping. Once across the crossing, but still in the foul of the track, the truck appears to be blocked by mailboxes just off the west side of Lanetown Road and stopped resulting in the accident. Due to the truck driver refusing to be interviewed, FRA was unable to determine why the driver chose to drive around the down gates.

### **Probable Cause and Contributing Factors**

The FRA investigation concluded the probable cause of the accident was cause code M308 – Highway user deliberately disregarded crossing warning devices.

Additionally, a possible contributing factor of cause code M301 – Highway user impairment because of drug or alcohol usage (as determined by local authorities, e.g., Police) was identified.